

AMENDMENTS TO THE CLAIMS

1-38. (Withdrawn)

39. (Currently Amended). A method of localizing known amounts of sample materials at each of one or more specific locations on a substrate, each specific location including an individually addressable force transducing element, the method comprising;

~~providing an analytical device comprising a substrate having a first surface, a crater formed in the first surface of said substrate, a sensing element integrated within said substrate proximal said crater, said sensing element configured to detect at least one physical property within said crater and a sample particle introduced in a fluid medium proximal said crater, wherein said crater is substantially commensurate in shape and size with a portion of said sample particle so as to hold said sample particle in place therein;~~

providing a plurality of sample particles proximal the substrate;

selectively activating one or more of said force transducing elements, wherein each the activated force transducing elements generates a field that attracts one or more of said particles to the corresponding specific locations; and

detecting, at each one or more of the activated locations, the number of particles attracted to the location, wherein the number of attracted particles is discrete and predetermined.

40. (Original) The method of claim 39, wherein each location includes a crater formed in said substrate proximal the force transducing element.

41. (Original) The method of claim 40, wherein the sample particles include magnetized beads, and wherein detecting includes detecting inductance changes in one or more conducting coils proximal the crater, said inductance changes caused by said particles entering said crater.

42-45. (Withdrawn)

46. (NEW) The method of claim 39, wherein the force transducing element generates a magnetic field.
47. (NEW) The method of claim 39, wherein the sample particles comprise magnetically active particles.
48. (NEW) The method of claim 47, further comprising applying a substantially uniform magnetic field to a portion of the substrate to increase the force on or between the magnetically active particles, wherein the uniform magnetic field is generated by an element with low power consumption.
49. (NEW) The method of claim 48, wherein said uniform magnetic field comprises the field of a permanent magnet.
50. (NEW) The method of claim 39, wherein the step of detecting further comprises detecting with a sensing element that is selected from the group consisting of: a pH sensor, an optical sensor, a radiation sensor, a magnetic induction sensor, a temperature sensor and a pressure sensor.
51. (NEW) The method of claim 39, wherein the step of detecting further comprises detecting with a sensing element that has a position relative to the specific locations selected from a group of positions consisting of: under the specific locations, adjacent to the specific locations, surrounding the specific locations, above the specific locations, between the specific locations, operably connected to the specific location by a signal-routing conduit, and combinations thereof.

52. (NEW) The method of claim 39, further comprising controllably repelling at least one of said particles from at least one of said locations.

53. (NEW) The method of claim 39, further comprising localizing a predetermined number of particles a predetermined specific location.

54. (NEW) The method of claim 39, further comprising regulating the number of particles at a location by repelling additional particles from that location.

55. (NEW) The method of claim 39, further comprising jointly controlling a plurality of the force transducing elements to pass a predetermined number of the particles between two adjacent locations.

56. (NEW) The method of claim 55, wherein the sample particles comprise magnetically active particles and the force transducing element generates a magnetic field that transduces force to at least some of the magnetically active particles.

57. (NEW) The method of claim 56, further comprising applying a substantially uniform magnetic field to a portion of the substrate to increase the force on or between the magnetic particles, wherein the uniform magnetic field is generated by an element with low power consumption.

58. (NEW) The method of claim 48, wherein said uniform magnetic field comprises a battery-powered device.

59. (NEW) A method of controllably localizing particles at specific locations on a substrate, each specific location proximal to an individually addressable force transducing element, the method comprising:

providing a plurality of particles proximal to the substrate;
providing a substantially uniform magnetic field of low power consumption that encompasses the specific locations and the particles;
selecting one or more force transducing elements to be activated; and
controllably localizing one or more particles to the specific locations by activating the selected force transducing elements to transduce a motive force to one or more particles proximal to the corresponding specific location, wherein the magnitude of the transduced force is substantially altered by the presence of the uniform field.

60. (NEW) The method of claim 59, wherein the uniform field comprises the field from a permanent magnet.

61. (NEW) The method of claim 59, wherein the uniform field includes a time-varying component.

62. (NEW) The method of claim 59, further comprising regulating the passage of electromagnetic radiation by controlling the positioning of one or more of the particles.

63. (NEW) The method of claim 59, wherein the uniform field is produced by a portable device.

64. (NEW) The method of claim 59, further comprising the step of regulating the uniform field or force transduction element to reduce contact between the particles.

65. (NEW) The method of claim 59, further comprising the step of regulating the clumping of the particles using a method that is selected from the group consisting of: applying vibrations, applying electrical fields, incorporating charges within the particles, applying magnetic fields, or adjusting fluid flow to reduce contact between the particles.

66. (NEW) The method of claim 59, wherein the particles are selected to comprise one or more discrete groups, and wherein each group has at least one substantially similar physical characteristic that affects localization of the group.

67. (NEW) The method of claim 66, wherein at least one of the groups comprises particles of substantially similar size or effective radius.

68. (NEW) The method of claim 66, wherein at least one of the groups comprises particles selected to comprise a substantially uniform shape.

69. (NEW) The method of claim 59, further comprising the step of controllably moving at least one of the particles from a first preferred location to a second preferred location by activation of force transducing elements.

70. (NEW) The method of claim 69, further comprising sensing localization of the particle proximal to a preferred location.

71. (NEW) The method of claim 59, further comprising:

releasing one or more of the particles from the corresponding specific
locations; and
recovering the one or more released particles from the substrate.

72. (NEW) The method of claim 59, wherein the force transducing elements generate a magnetic field, and the particles are magnetically active.

73. (NEW) The method of claim 72, wherein the magnetically active particles include one or more discrete groups that are distinguishable on the basis of physical properties that affect their localization with respect to properties that is selected from the group of properties consisting of:

magnetic field strength, time-bearing magnetic fields, viscosity of surrounding fluid, resistance of surrounding fluid, density, mass, inertia, size, geometric shape, and effective radius.

74. (NEW) The method of claim 40, wherein the sample particles comprise a plurality of lid particles of sufficient size to substantially close the opening of the crater.

75. (NEW) The method of claim 40, wherein the attracted particles move a substantial distance, the distance being sufficient to exceed the radius of the respective particle.

76. (NEW) The method of claim 69, wherein the first preferred location and the second preferred location controllably exchange one particle.

77. (NEW) The method of claim 39, further comprising using a microfabricated sensor for detection.

78. (NEW) The method of claim 70, further comprising using a microfabricated sensor for sensing localization.